

Appln. No.: 10/606,825
Reply to Office Action of December 27, 2005

REMARKS

Claims 1, 4-5, 7-18, 20-25, 28-29, 31-41, 43-48, 51-52, and 54-61 remain in this application with claims 1, 25, and 48 in independent form. Claims 2-3, 6, 19, 26-27, 30, 42, 49-50, 53 have been cancelled and claims 1, 15, 20, 25, 43, 48, and 59-61 have been amended. There is full support throughout the specification as originally filed for these amendments and no new matter is believed to be introduced in these amendments.

Applicant submits herewith a petition for a two-month extension of time to extend the period of reply to Saturday, May 27, 2006. Under 37 C.F.R. §1.7, the period of reply was extended until Tuesday, May 30, 2006. As such, the subject reply is believed to be timely.

The Examiner objected to the specification filed October 17, 2005 under 35 U.S.C. §132(a) because the Examiner contends that the amendment introduced new matter into the disclosure. Applicant has amended paragraph [0030] as suggested by the Examiner. Thus, the objection has been overcome.

Claims 1, 4, 5, 7-25, 28, 29, 31-48, 51, 52, and 54-61 stand rejected under 35 U.S.C. §112, first paragraph as failing to comply with the written description requirement. Specifically, the Examiner contends that claims 59-61 introduce new matter as result of claiming that the chain extender has a hydroxyl number of from about 448 to about 4488 mg KOH/g. Claims 59-61 have been amended and the §112 rejection is believed to be overcome.

Claim Rejections – 35 U.S.C. § 103

Claims 1, 4, 5, 7-25, 28, 29, 31-48, 51, 52, and 54-61 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Bleys (United States Patent No. 5,968,993); as

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being unpatentable over Hager et al. (United States Patent No. 6,391,935); and as being unpatentable over Lutter et al. (United States Patent No. 5,420,170).

The Examiner has not established the requisite *prima facie* case of obviousness in relation to claims 1, 4-5, 7-18, 20-25, 28-29, 31-41, 43-48, 51-52, and 54-61. To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the prior art reference (or references when combined) must teach or suggest all the claim limitations. See Manual of Patent Examining Procedure (MPEP) § 2143.

Applicant submits herewith, as Exhibit A, a Declaration under 37 C.F.R. §1.132 from one highly skilled in the art of polyurethane formulation. The Declaration sets forth the results of various viscoelastic polyurethane foams formed according to the subject invention that are attributable to the composition as claimed. Further, the Declaration sets forth sample foams prepared in accordance with the references relied upon the Examiner and addresses the impropriety and inoperability of modifying such references, which modifications do not arrive at the subject invention as claimed. It is well settled that all of the competent rebuttal evidence taken as a whole should be weighed against the evidence supporting the *prima facie* case. *In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984).

Applicant addresses each of the independent claims, claims 1, 25, and 48 separately below.

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Bleys (United States Patent No. 5,968,993)

Referring to the §103 rejection based upon Bleys, the Examiner states that Bleys discloses preparations of polyurethane foams prepared from isocyanates, polyols, and chain extenders that have densities as claimed. Specifically, the Examiner cited Example 3 of Bleys that produces a microcellular elastomeric polyurethane foam having a density of 420 kg/m³, or 26.2 pounds per cubic foot. Further, the Examiner contends that Bleys discloses preferred densities of less than 600 kg/m³. The Examiner then contends it would have been obvious for one having ordinary skill in the art to vary the amounts of the blowing agents to arrive at Applicant's claims.

Claim 1

Claim 1 has been amended to recite a viscoelastic polyurethane foam comprising a reaction product of an isocyanate component and an isocyanate-reactive component comprising ***a flexible polyol and an ethylene-oxide rich polyol*** having an ethylene-oxide group content of from 40 to 95%. The isocyanate component and the isocyanate-reactive component are reacted at ***an isocyanate index of from 80 to 105***. The viscoelastic polyurethane foam also includes a chain extender having a backbone chain with from two to eight carbon atoms and having two isocyanate-reactive groups and a weight-average molecular weight of from 25 to 250. The chain extender is used in an amount of from 7 to 30 parts by weight based on 100 parts by weight of the foam and the foam has the ***glass transition temperature of from 5 to 65 degrees Celsius and a tan delta peak of from 0.40 to 1.75*** and a density of from 2.5 pounds per cubic foot to 25 pounds per cubic foot.

Referring to the Declaration submitted under 37 C.F.R. §1.132, the Declaration addresses the impropriety of modifying Bleys when viewed as a whole and without using

impermissible hindsight and the inoperability when modified as the Examiner suggests. Specifically, Bleys is directed toward microcellular elastomeric polyurethane foams, which does not exhibit viscoelastic properties. Bleys requires the microcellular elastomeric polyurethane foam to have a Shore A hardness of at least 85 (see col. 3, lines 23-29). Shore hardness is a measure of the resistance of material to indentation by a 3 spring-loaded indenter. The higher the number, the greater the resistance. Typically, Shore A hardness ranges from about 20 to about 95. Illustrative materials that fall within this range include printing rolls, door seals, solid truck tires, abrasive-handling pads, and non-spark hammers. As made clear by the Declaration, viscoelastic polyurethane foams are flexible and, as such; do not have a Shore A hardness falling within this range, if at all. Since Bleys is directed toward microcellular elastomeric polyurethane foams having a Shore A hardness of at least 85, one of ordinary skill in the art would not look to Bleys when manufacturing viscoelastic polyurethane foams.

Bleys does not disclose, teach, or suggest, an isocyanate-reactive component comprising *a flexible polyol and an ethylene-oxide rich polyol* having an ethylene-oxide group content of from 40 to 95%. Bleys also does not disclose, teach, or suggest, the microcellular elastomeric polyurethane foams having a glass transition temperature of from 5 to 65 degrees Celsius and a tan delta peak of from 0.40 to 1.75. Accordingly, Bleys does not disclose, teach, or suggest each and every limitation present in claim 1 and there is no teaching or suggestion to modify Bleys as the Examiner suggests. Therefore, the §103 rejection is overcome and claim 1 is believed to be allowable. Claims 4, 5, 7-18, and 20-24, which depend directly or indirectly from claim 1, are also believed to be allowable.

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Claim 25

Claim 25 has been amended to claim a composition for use in forming a viscoelastic polyurethane foam having a density of from 2.5 pounds per cubic foot to 25 pounds per cubic foot. The composition comprises an isocyanate component substantially free of toluene diisocyanate and an isocyanate-reactive component comprising ***a flexible polyol and an ethylene-oxide rich polyol having an ethylene-oxide group content of from 40 to 95%***. The isocyanate component and the isocyanate-reactive component are reacted at an isocyanate index of from 80 to 105. The composition also includes a chain extender having a backbone chain with from two to eight carbon atoms and having two isocyanate-reactive groups and a weight-average molecular weight of from 25 to 250. The chain extender is present in an amount of from 7 to 30 parts by weight based on 100 parts by weight of the composition.

As described above, Bleys discloses a microcellular elastomeric polyurethane foam, and does not disclose, teach, or suggest, a composition for forming a viscoelastic polyurethane foam. To the contrary, Bleys specifically requires the microcellular elastomeric polyurethane foam to have Shore A hardness of at least 85. It is well known by those of ordinary skill in the art that such measurements are for rigid and semi-rigid products, whereas viscoelastic polyurethane foams do not have a Shore A hardness of at least 85. Even though Bleys discloses that the microcellular elastomeric polyurethane foam has a preferred density of less 600 kg/m³ (or 37.5 pcf), the microcellular elastomeric polyurethane foam must also have the requisite Shore A hardness. The viscoelastic polyurethane foams made according to the subject invention do not satisfy such criteria.

Accordingly, Bleys does not disclose, teach, or suggest each and every limitation present in claim 25 and there is no teaching or suggestion to modify Bleys as the

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Examiner suggests. Therefore, the §103 rejection is overcome and claim 25 is believed to be allowable. Claims 28-29, 31-41, and 43-47, which depend directly or indirectly from claim 25, are also believed to be allowable.

Claim 48

Claim 48 has been amended to recite a method of forming a viscoelastic polyurethane foam. The method comprises the steps of providing an isocyanate component substantially free of flame retardant, providing an isocyanate-reactive component comprising *a flexible polyol and an ethylene-oxide rich polyol* having an ethylene-oxide group content of from 40 to 95%, and providing a chain extender having a backbone chain with from two to eight carbon atoms and having two isocyanate-reactive groups and a weight-average molecular weight of from 25 to 250, wherein the chain extender is used in an amount of from 7 to 30 parts by weight based on 100 parts by weight of the foam. The method also includes reacting the isocyanate component, the isocyanate-reactive component, and the chain extender *at an isocyanate index of from 80 to 105* to form the foam having *a tan delta peak of from 0.40 to 1.75* and having a density of from 2.5 pounds per cubic foot to 25 pounds per cubic foot. The method further includes *adjusting the amount of the chain extender* to provide the foam with *a glass transition temperature of from 5 to 65 degrees Celsius* corresponding to a use temperature of the foam.

Bleys does not disclose, teach, or suggest, the novel and unique step of adjusting the amount of the chain extender to provide the foam with a glass transition temperature of from 5 to 65 degrees Celsius corresponding to a use temperature of the foam. Bleys is silent as to glass transition temperature of the microcellular elastomeric polyurethane

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foam and to any connection between the presence of the chain extender and the glass transition temperature.

Further, Bleys does not disclose, teach, or suggest, reacting the isocyanate component, the isocyanate-reactive component, and the chain extender at an isocyanate index of from 80 to 105 to form the foam having a tan delta peak of from 0.40 to 1.75 and having a density of from 2.5 pounds per cubic foot to 25 pounds per cubic foot. Even though Bleys discloses the microcellular elastomeric polyurethane foam having a density of less than 37.5 pcf, Bleys is silent as to a tan delta peak of the microcellular elastomeric polyurethane foam.

Accordingly, Bleys does not disclose, teach, or suggest, each and every limitation present in claim 48 and there is no teaching or suggestion to modify Bleys as the Examiner suggests. Therefore, the §103 rejection is overcome and claim 48 is believed to be allowable. Claims 51, 52, and 54-61, which depend directly or indirectly from claim 48, are also believed to be allowable.

Hager et al. (United States Patent No. 6,391,935)

Referring to the §103 rejection based upon Hager et al., the Examiner states that Hager et al. discloses preparations of polyurethane foams prepared from isocyanates, polyols, and chain extenders having densities claimed. The Examiner also states that Hager et al. differs from the claimed invention in that the chain extenders are not particularly employed in the amounts claimed. The Examiner contends that since the amount of chain extender may be varied for the purposes of controlling polymer build-up, it would have been obvious to vary the amount of chain extender to arrive at the claimed invention for the purpose of controlling polymer build-up.

Claim 1

To summarize, claim 1 has been amended to recite the isocyanate-reactive component comprising ***a flexible polyol and an ethylene-oxide rich polyol*** having an ethylene-oxide group content of from 40 to 95%. The isocyanate component and the isocyanate-reactive component are reacted at ***an isocyanate index of from 80 to 105***. Further, the chain extender is used in an amount of from 7 to 30 parts by weight based on 100 parts by weight of the foam and the foam has the ***glass transition temperature of from 5 to 65 degrees Celsius and a tan delta peak of from 0.40 to 1.75*** and a density of from 2.5 pounds per cubic foot to 25 pounds per cubic foot.

Referring again to the Declaration under 37 C.F.R. §1.132, the Declaration addresses the impropriety of modifying Hager et al. and the inoperability when modified as the Examiner suggests. Hager et al. is silent as to the glass transition temperature of the viscoelastic polyurethane foam formed therein. As such, the Declaration compared foams prepared based upon the teachings of Hager et al. to the subject invention as claimed.

Specifically, the foams were prepared in accordance with Examples 16 and 19 having the chain extender present in an amount of 2 parts by weight. The resultant foams had a glass transition temperature of less than 0 °C. Evidence of unobvious or unexpected advantageous properties, such as superiority in a property the claimed compound shares with the prior art, can rebut *prima facie* obviousness. “Evidence that a compound is unexpectedly superior in one of a spectrum of common properties . . . can be enough to rebut a *prima facie* case of obviousness.” No set number of examples of superiority is required. *In re Chupp*, 816 F.2d 643, 646, 2 USPQ2d 1437, 1439 (Fed. Cir.

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1987). Further, there is no disclosure, teaching, or suggestion of adjusting the amount of the chain extender to increase the glass transition temperature to coincide with the use temperature.

In comparison with the first set of examples set forth in the Declaration, even when the subject invention has the same or less chain extender than disclosed in Hager et al., the viscoelastic polyurethane has a glass transition temperature greater than 0 °C. There is no recognition within Hager et al. that the glass transition temperature can be adjusted by manipulating the amount of the chain extender in the amount claimed. In fact, Hager et al. teaches away from using the chain extender in the amounts claimed. Hager et al. discloses that the chain extender may *optionally* be used and if used in only used in a minor proportion, i.e., less than 5 wt%. Even though the Examiner contends that the chain extender may be used for increasing polymer build-up, *nowhere* is such a purpose disclosed in Hager et al. As such, Hager et al. does not disclose, teach, or suggest, a viscoelastic polyurethane foam having a glass transition temperature of from 5 to 65 degrees Celsius *and* a tan delta peak of from 0.40 to 1.75 *and* a density of from 2.5 pounds per cubic foot to 25 pounds per cubic foot.

Accordingly, Hager et al. does not disclose, teach, or suggest, each and every limitation present in claim 1 and there is no teaching or suggestion to modify Hager et al. as the Examiner suggests. Therefore, the §103 rejection is overcome and claim 1 is believed to be allowable. Claims 4, 5, 7-18, and 20-24, which depend directly or indirectly from claim 1, are also believed to be allowable.

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Claim 25

Similarly to claim 1, claim 25 has been amended to claim the isocyanate-reactive component comprising *a flexible polyol and an ethylene-oxide rich polyol having an ethylene-oxide group content of from 40 to 95%* and the isocyanate component and the isocyanate-reactive component are reacted at an isocyanate index of from 80 to 105. The chain extender is present in an amount of from 7 to 30 parts by weight based on 100 parts by weight of the composition.

As described above, Hager et al. does not disclose, teach, or suggest, a composition for forming a viscoelastic polyurethane foam employing chain extenders in the amounts claimed. To the contrary, Hager et al. specifically teaches away from the claimed invention by using chain extenders *optionally* in amount of from 0.1 to 5 wt %. There is no suggestion or motivation with Hager et al. to employ the chain extender in the amount claimed. Further, Hager et al. does not disclose, teach, or suggest the particular isocyanate-reactive component as claimed.

Accordingly, Hager et al. does not disclose, teach, or suggest, each and every limitation present in claim 25 and there is no teaching or suggestion to modify Hager et al. as the Examiner suggests. Therefore, the §103 rejection is overcome and claim 25 is believed to be allowable. Claims 28-29, 31-41, and 43-47, which depend directly or indirectly from claim 25, are also believed to be allowable.

Claim 48

To reiterate, claim 48 has been amended to recite providing an isocyanate-reactive component comprising *a flexible polyol and an ethylene-oxide rich polyol having an ethylene-oxide group content of from 40 to 95%* and reacting the isocyanate component,

the isocyanate-reactive component, and the chain extender *at an isocyanate index of from 80 to 105* to form the foam having *a tan delta peak of from 0.40 to 1.75* and having a density of from 2.5 pounds per cubic foot to 25 pounds per cubic foot. The method further includes *adjusting the amount of the chain extender* to provide the foam with *a glass transition temperature of from 5 to 65 degrees Celsius* corresponding to a use temperature of the foam.

Hager et al. does not disclose, teach, or suggest, the novel and unique step of adjusting the amount of the chain extender to provide the foam with a glass transition temperature of from 5 to 65 degrees Celsius corresponding to a use temperature of the foam. Hager et al. is silent as to glass transition temperature of the viscoelastic polyurethane foam and to any connection between the presence of the chain extender and the glass transition temperature. The Declaration submitted herewith compared foams prepared according to the disclosure of Hager et al. and the resultant foams had glass transition temperatures of less than 0 °C. One of ordinary skill in the art, upon reviewing Hager et al., would not be so motivated to adjust the amount of the chain extender within the claimed ranges to arrive at a viscoelastic polyurethane foam having a glass transition temperature of from 5 to 65 °C.

Accordingly, Hager et al. does not disclose, teach, or suggest, each and every limitation present in claim 48 and there is no teaching or suggestion to modify Hager et al. as the Examiner suggests. Therefore, the §103 rejection is overcome and claim 48 is believed to be allowable. Claims 51, 52, and 54-61, which depend directly or indirectly from claim 48, are also believed to be allowable.

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Lutter et al. (United States Patent No. 5,420,170)

Referring to the §103 rejection based upon Lutter et al., the Examiner states that Lutter et al. discloses preparations of polyurethane foams prepared from isocyanates, polyols, and chain extenders having densities claimed. The Examiner also states that Lutter et al. recites variation of amounts of chain extenders that overlap with the claimed ranges. The Examiner contends that since the amount of chain extender may be varied for the purposes of controlling polymer build-up, it would have been obvious to vary the amount of chain extender to arrive at the claimed invention for the purpose of controlling polymer build-up.

Claim 1

Claim 1 recites a viscoelastic polyurethane foam having the *glass transition temperature of from 5 to 65 degrees Celsius and a tan delta peak of from 0.40 to 1.75* and a density of from 2.5 pounds per cubic foot to 25 pounds per cubic foot and using the chain extender in an amount of from 7 to 30 parts by weight based on 100 parts by weight of the foam.

Referring again to the Declaration under 37 C.F.R. §1.132, the Declaration addresses the impropriety of modifying Lutter et al and the inoperability of modifying Lutter et al. as the Examiner suggests. Lutter et al. is silent as to the glass transition temperature of the viscoelastic polyurethane foam formed therein. As such, the Declaration compared foams prepared based upon the teachings of Lutter et al. with those of the subject invention.

Specifically, the foams were prepared in accordance with Example 6 having the chain extender present in an amount of 6 parts by weight. The resultant foam had a glass

transition temperature of 52 °C. Foams having such a high glass transition temperature become rigid and no longer have viscoelastic properties, as set forth in the attached Declaration. Those of ordinary skill in the art would anticipate that increasing the amount of the chain extender, as taught by Lutter et al., would *further increase* the glass transition temperature resulting in the foam becoming more rigid. Evidence of unobvious or unexpected advantageous properties, such as superiority in a property the claimed compound shares with the prior art, can rebut *prima facie* obviousness. “Evidence that a compound is unexpectedly superior in one of a spectrum of common properties . . . can be enough to rebut a *prima facie* case of obviousness.” No set number of examples of superiority is required. *In re Chupp*, 816 F.2d 643, 646, 2 USPQ2d 1437, 1439 (Fed. Cir. 1987). Further, there is no disclosure, teaching, or suggestion of adjusting the amount of the chain extender to have the glass transition temperature coincide with the use temperature of the foam.

In comparison with the first set of examples set forth in the Declaration, even when the subject invention has a higher amount of chain extender than the examples of Lutter et al., the viscoelastic polyurethane has a glass transition temperature lower than 52 °C. As such, Lutter et al. does not disclose, teach, or suggest, a viscoelastic polyurethane foam as claimed.

Accordingly, Lutter et al. does not disclose, teach, or suggest, each and every limitation present in claim 1 and there is no teaching or suggestion to modify Lutter et al. as the Examiner suggests. Therefore, the §103 rejection is overcome and claim 1 is believed to be allowable. Claims 4, 5, 7-18, and 20-24, which depend directly or indirectly from claim 1, are also believed to be allowable.

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Claim 25

As described above, Lutter et al. does not disclose, teach, or suggest, a composition for forming a viscoelastic polyurethane foam employing chain extenders in the specific amounts claimed to arrive at a foam having a glass transition temperature as claimed. To the contrary, foams formed in accordance with Lutter et al. have significantly higher glass transition temperatures when prepared with lower amounts of chain extender. As such, increasing the amount of the chain extender would further increase the glass transition temperature. There is no suggestion or motivation with Lutter et al. to employ the chain extender in the amount claimed to arrive at a foam according to the subject invention.

Accordingly, Lutter et al. does not disclose, teach, or suggest, each and every limitation present in claim 25 and there is no teaching or suggestion to modify Lutter et al. as the Examiner suggests. Therefore, the §103 rejection is overcome and claim 25 is believed to be allowable. Claims 28-29, 31-41, and 43-47, which depend directly or indirectly from claim 25, are also believed to be allowable.

Claim 48

Claim 48 has been amended to recite the viscoelastic polyurethane foam is formed by reacting the isocyanate component, the isocyanate-reactive component, and the chain extender *at an isocyanate index of from 80 to 105* to form the foam having *a tan delta peak of from 0.40 to 1.75* and having a density of from 2.5 pounds per cubic foot to 25 pounds per cubic foot. The method further includes *adjusting the amount of the chain extender* to provide the foam with *a glass transition temperature of from 5 to 65 degrees Celsius* corresponding to a use temperature of the foam.

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Lutter et al. does not disclose, teach, or suggest, the novel and unique step of adjusting the amount of the chain extender to provide the foam with a glass transition temperature of from 5 to 65 degrees Celsius corresponding to a use temperature of the foam. Lutter et al. is silent as to glass transition temperature of the viscoelastic polyurethane foam and to any connection between the presence of the chain extender and the glass transition temperature. The Declaration submitted herewith analyzed foams prepared according to the disclosure of Hager et al. and the resultant foam had a glass transition temperature of 52 °C. One of ordinary skill in the art, upon reviewing Lutter et al., would not be so motivated to adjust the amount of the chain extender within the claimed ranges to arrive at a viscoelastic polyurethane foam having a glass transition temperature of from 5 to 65 °C.

Accordingly, Lutter et al. does not disclose, teach, or suggest, each and every limitation present in claim 48 and there is no teaching or suggestion to modify Lutter et al. as the Examiner suggests. Therefore, the §103 rejection is overcome and claim 48 is believed to be allowable. Claims 51, 52, and 54-61, which depend directly or indirectly from claim 48, are also believed to be allowable.

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It is respectfully submitted that the Application, as amended, is now presented in condition for allowance, which allowance is respectfully solicited. Applicant believes that no fees are due, however, if any become required, the Commissioner is hereby authorized to charge any additional fees or credit any overpayments to Deposit Account 08-2789.

Respectfully submitted

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EXHIBIT A